



2600 Bull Street
Columbia, SC 29201-1708

MEMORANDUM

File 51306

| QUICK REFERENCE FOR STATUS OF ENVIRONMENTAL INDICATORS | | | | | |
|--|--|------------------------------|------------------------------|---|-------|
| Name and EPA I.D. Number | Location (City or Town) | Current CA725 Decision | Current CA750 Decision | If Current Decision is Negative, Projected Date for Positive EI | |
| | | | | CA725 | CA750 |
| Wolverine Brass Works SCD 990 704 470 | Conway Horry County South Carolina | YE | YE | -- | -- |

DATE September 12, 2001

SUBJ Evaluation of Wolverine Brass Works' status under the RCRIS Corrective Action
Environmental Indicator Event Codes (CA725 and CA750)
EPA I.D. Number SCD 990 704 470

FROM Robert F. Hodges, Jr., P.G. *RFH*
RCRA Hydrogeology II
Division of Hydrogeology
Bureau of Land and Waste Management

THRU Joe Bowers, P.G., Manager *JB*
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Bureau of Land and Waste Management

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Bureau of Land and Waste Management

TO Wolverine Brass Works Project File
SCD 990 704 470
BLWM Central File #51306

I. PURPOSE OF MEMO

This memo is written to formalize an evaluation of Wolverine Brass Works' status in relation to the following corrective action event codes defined in the Resource Conservation and Recovery Information System (RCRIS):

- 1) Current Human Exposures Under Control (CA725),
- 2) Migration of Contaminated Groundwater Under Control (CA750).

Concurrence by the Bureau of Land and Waste Management Division of Hydrogeology's Director is required prior to entering these event codes into RCRIS. Your concurrence with the interpretations provided in the following paragraphs and the subsequent recommendations is satisfied by dating and signing at the appropriate location within Attachments 1 and 2.

II. HISTORY OF ENVIRONMENTAL INDICATOR EVALUATIONS AT THE FACILITY AND REFERENCE DOCUMENTS

This particular evaluation is the second evaluation for Wolverine Brass Works. A copy of the first evaluation, performed in June of 1998, is attached. At that time, evaluators were prepared to recommend a **YES** status code for CA725 and CA750, however, a recently (at that time) identified release in the vicinity of a Lift Station (SWMU No.5) warranted additional assessment. The following summarizes conclusions of the June 1998 evaluation and the subsequent follow-up assessment activity.

Remedial measures were determined to have been successful in controlling plausible human exposures in all applicable media at the surface impoundment area of the site. However, additional information was needed in the vicinity of the Lift Station. Therefore, the June 1998 evaluation recommended that CA725 IN be entered into RCRIS.

Although there was hydraulic control of contaminated groundwater and an active groundwater remediation system at the surface impoundments, there was insufficient data regarding the recently identified groundwater plume in the vicinity of the Lift Station. Because of the insufficient information regarding the extent of the groundwater plume in the vicinity of the Lift Station, the June 1998 evaluation recommended that CA750 IN be entered into RCRIS.

Subsequent assessment in the vicinity of the Lift Station (SWMU No.5) included the installation of twelve additional monitoring wells (RFI Report September 17, 1999). Contamination was determined in groundwater only. Groundwater-quality monitoring has been conducted on a quarterly basis since July of 1999, the data and information for which has been made part of the groundwater monitoring program for the RCRA Units (former surface impoundments). The

groundwater monitoring program for the RCRA Units (former surface impoundments) The groundwater contaminant plume has been well defined horizontally and vertically and is situated up-gradient of an operating corrective action system consisting of continuous pumping from three recovery wells, in operation since July 25, 1988 Therefore, based on historical and current data and information, an EI decision of **YES** is determined for both RCRIS event codes CA725 and CA750

III. FACILITY SUMMARY

The Wolverine Brass Works facility is located six miles east of Conway on Highway 501 in Horry County Surrounding land is zoned limited industrial, office professional, and highway commercial Land use in the vicinity includes commercial and industrial purposes Commercial businesses (Domino's Delivery, and auto body repair) are located on adjacent property east of the facility US Highway 501 borders the facility property to the south A golf driving range is located on adjacent land to the west, beyond which is an electroplating facility (AVX Corporation) A warehouse (Wolverine Brass Works is the parent company of the warehouse owner) occupies the adjacent land to the north, with Seaboard Coastline Railroad and Santee Cooper property beyond.

Wolverine Brass Works manufactures plumbing fixtures Plumbing fixtures are fabricated and chrome plated, generating waste electroplating solution containing chromium and cadmium classified as hazardous waste by corrosivity (D002) and toxicity due to cadmium (D006) and chromium (D007). Wolverine Brass Works formerly operated two surface impoundments Prior to the closure of these two units, process wastewater was held in surface impoundment #1, treated to precipitate metals, and then pumped to surface impoundment #2 After closure of the impoundments in June 1987, process wastewater was transferred to an on-site wastewater treatment plant Releases from the closed surface impoundments are regulated by postclosure care permit SCD 990 704 470, August 30, 1993 issued under the Resource Conservation and Recovery Act (RCRA) of 1976

The RCRA Facility Assessment conducted in 1986 identified sixteen (16) solid waste management units (SWMUs) Surface impoundments #1 and #2 were identified as SWMU No. 4 and SWMU No. 10, respectively. The postclosure permit required a RCRA Facility Investigation for the onsite wastewater treatment plant Lift Station, SWMU No. 5 The initial SWMU No. 5 investigation in September of 1996 detected chlorinated volatile organic compounds (VOCs) in groundwater in vicinity of the Lift Station As part of additional investigations in 1999, twelve monitoring wells (W-21 through W32) were installed in the area. SWMU No. 17 (process water pipeline) and SWMU No. 18 (catch basin) were identified in June of 2000 SWMU No. 18 was discounted as a VOC source, groundwater impact was implicated from SWMU No. 17 The area of the facility encompassing SWMU No. 5, SWMU No. 17, and SWMU No. 18 has been designated the Solid Waste Management Area (SWMA).

The uppermost aquifer beneath the facility consists of a layer of surficial sand (Unit 1), underlain by a confining layer of silty clay (Unit 2) A lower, artesian aquifer (Unit 3) underlies the

general direction of Unit 1 groundwater flow is northeast where groundwater discharges to an engineered drainage canal which penetrates Unit 1 sediments. A Corrective Action Program, consisting of continuous pumping from three recovery wells, has been in operation since July 25, 1988. Treated groundwater is discharged to the POTW.

IV. CONCLUSION FOR CA725 **(Brief Outline of Issues Leading to an EI of YE, NO or IN)**

YE - Yes, ACurrent Human Exposures Under Control@has been verified. Based on a review of the information contained in this EI Determination, ACurrent Human Exposures@are expected to be AUnder Control@

Groundwater is the only contaminated media. There are no complete current exposure pathways: There are no water supply wells in the vicinity of the facility and the area is supplied with municipal drinking water from a municipal system. Air-monitoring samples collected from two on-site buildings produced negative results. Potential receptors are:

| | |
|---------------|---|
| Residents: | Land not zoned for residential use |
| Workers: | Site work is non-intrusive, limited intrusive work is governed by Site-specific Health and Safety Protocols |
| Day Care: | No Day-Care facilities are in proximity to the facility |
| Construction: | Limited intrusive work is governed by Site-specific Health and Safety Protocols |
| Trespassers: | Engineered site controls limits potential trespasser access |
| Recreation: | Land and location are not suitable for recreation use |
| Food: | Land and location are not suitable for food production |

V. CONCLUSION FOR CA750 **(Brief Outline of Issues Leading to an EI of YE, NO or IN)**

YE - Yes, AMigration of Contaminated Groundwater Under Control@has been verified. Based on a review of the information contained in this EI determination, it has been determined that the AMigration of Contaminated Groundwater@is AUnder Control.@

Groundwater quality monitoring in the vicinity of the former impoundments has been ongoing since 1986; and, at the SWMA since 1999. The plumes have been well defined horizontally and vertically. A Corrective Action Program, consisting of continuous pumping from three recovery wells has been in place since 1988. The recovery wells, the resulting cone of depression, and therefore, the capture zone are situated in the vicinity of the former surface impoundments and

therefore, the capture zone are situated in the vicinity of the former surface impoundments and downgradient of the SWMA

Post-Closure Permit No SCD 990 704 470 requires groundwater quality monitoring, on a quarterly basis with semi-annual reporting for the surface impoundments. Beginning with the Fourth Quarter of 1999, the monitoring reports include groundwater quality monitoring data for the SWMA

VI. SUMMARY OF FOLLOW-UP ACTIONS

(Discussion of What is Needed to Get to Yes, with EI Interim Milestone Schedule)

A *Yes* determination has been made for this facility with regard to CA725 and CA750. Therefore, no follow-up actions are warranted.

VII. LEVEL OF CONFIDENCE IN REACHING A POSITIVE EI EVALUATION AND MAJOR ISSUES

A *Yes* determination has been made for this facility with regard to CA725 and CA750. Therefore, there are no major issues to be considered.

Attachments 1 CA725 Current Human Exposures Under Control
 2 CA750. Migration of Contaminated Groundwater Under Control

Cc Tony Saturni, TRW Inc.
 Bill Corder, BLWM
 Boyd Holt, Waccamaw District EQC
 Narindar Kumar, Branch Chief, US EPA Region IV

ATTACHMENT I
DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRIS Code (CA725)
Current Human Exposures Under Control

Facility Name: WOLVERINE BRASS WORKS
Facility Address: CONWAY, HORRY COUNTY
Facility EPA ID #: SCD 990 704 470

- 1 Has all available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

√ If yes - check here and continue with #2 below,
 If no - re-evaluate existing data, or
 If data are not available skip to #6 and enter "IN" (more information needed)
status code

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA) The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e , potential future human exposure scenarios, future land and groundwater uses, and ecological receptors)

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e , RCRIS status codes must be changed when the regulatory authorities become aware of contrary information)

- 2 Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be "**contaminated**"¹ above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

| Media | Yes | No | ? | Rationale/Key Contaminants |
|-------------------------------|-----|----|---|-----------------------------|
| Groundwater | X | | | Ref 5 6,7 / metals and VOCs |
| Air (indoors) ² | | X | | Ref 1,2,3,4,5,6,7 |
| Surface Soil (e g., <2 ft) | | X | | Ref 1,2,3,4,5,6,7 |
| Surface Water | | X | | Ref. 1,2,7 |
| Sediment | | X | | Ref. 1,2,7 |
| Subsurface Soil (e g , >2 ft) | | X | | Ref 1,2,3,4,5,6,7 |
| Air (outdoors) | | X | | Ref 1,2 |

_____ If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded

_____/____ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation

¹ "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range)

² Recent evidence (from the Colorado Dept of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks

**RCRA Corrective Action
Environmental Indicator (EI) RCRIS Event Code (CA725)**

Version Interim Final
2/5/99

_____ If unknown (for any media) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

- Ref. 1** RCRA Postclosure Care Part A and B Application, revised January 22, 1993
- Ref. 2** Postclosure Permit, issued August 31, 1993
- Ref. 3** RFI Report for Lift Station Investigation, dated December 1996
- Ref. 4** Addendum to RFI Report for Lift Station (SWMU #5), dated May 13, 1998
- Ref. 5** RFI Report for SWMU #5, September 17, 1999
- Ref. 6** SWMU Assessment Report, No 17 and No 18, August 31, 2000
- Ref. 7** 2001 Semi-Annual Report on the Effectiveness of the Corrective Action Program and the Solid Waste Management Area, dated August 29, 2001
- Ref. 8** Administrative Record as contained in the Bureau of Land and Waste Management's Central File, SCDHEC

Key Contaminants:

| Contaminant (units) | GWPS | Highest Concentration* On May 10 and 11, 2001 (well ID) |
|-----------------------------------|-------|--|
| 1,1-Dichloroethylene (µg/l) | 7 0 | < 5 0 (W-7) |
| Cis-1,2-Dichloroethylene (µg/l) | 70 0 | 61 (W-10) |
| Trans-1,2-Dichloroethylene (µg/l) | 100 0 | 2 0 (W-5) |
| Trichloroethylene (µg/l) | 5 0 | 1 4 (W-4) |
| Vinyl chloride (µg/l) | 2 0 | < 5 0 (W-7, W-10) |
| Barium (mg/l) | 1 0 | 0 072 (W-5) |
| Chromium (mg/l) | 0 05 | 0 038 (W-5) |
| Lead (mg/l) | 0 015 | 0 016 (W-6) |
| Nickel (mg/l) | 0 04 | 1 6 (W-2) |

* Excluding well M-12R determined to be within one of the regulated units (surface impoundment)

- 3 Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

| <u>Summary Exposure Pathway Evaluation Table</u> <u>Potential Human Receptors (Under Current Conditions)</u> | | | | | | | |
|---|-----------|---------|--------------|--------------|-------------|------------|-------------------|
| <u>"Contaminated"</u> <u>Media</u> | Residents | Workers | Day- Care | Construction | Trespassers | Recreation | Food ³ |
| Groundwater | No | No | No | No | No | No | No |

Instructions for Summary Exposure Pathway Evaluation Table

- 1 For Media which are not "contaminated" as identified in #2, please strike-out specific Media, including Human Receptors' spaces, or enter "N/C" for not contaminated.
- 2 Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway)

Note In order to focus the evaluation to the most probable combinations, some potential "Contaminated" Media - Human Receptor combinations (Pathways) are not assigned spaces in the above table (i.e., **N/L - not likely**) While these combinations may not be probable in most situations, they may be possible in some settings and **should be added as necessary**

- ✓ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways)
- If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation
- If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

Ref 5, Ref 6, Ref 7, Ref 8

There are no water supply wells in the vicinity of the facility and the area is supplied with municipal drinking water from a municipal system. Air-monitoring samples collected from two on-site buildings produced negative results

- Residents:** Land not zoned for residential use
- Workers:** Site work is non-intrusive, limited intrusive work is governed by Site-specific Health and Safety Protocols
- Day Care:** No Day-Care facilities are in proximity to the facility
- Construction:** Limited intrusive work is governed by Site-specific Health and Safety Protocols
- Trespassers:** Engineered site controls limits potential trespasser access
- Recreation:** Land and location are not suitable for recreation use
- Food:** Land and location are not suitable for food production

- 4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be "**significant**"⁴ (i.e., potentially "unacceptable" because exposures can be reasonably expected to be 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"), or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

- _____ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."
- _____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."
- _____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and

Reference(s) _____

⁴ If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience

5 Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e g , a site-specific Human Health Risk Assessment)

_____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and

Reference(s) _____

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility)

√ YE - Yes, "Current Human Exposures Under Control" has been verified Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Wolverine Brass Works facility, EPA ID # SCD 990 704 470, located at US Highway 501 in Conway, Horry County, South Carolina under current and reasonably expected conditions This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility

____ NO - "Current Human Exposures" are NOT "Under Control "

____ IN - More information is needed to make a determination.

Completed by Robert F. Hodges, Jr Date 09/12/01
(signature)
Robert F. Hodges, Jr Hydrogeologist
(print) (title)

Supervisor Joe B Bowers Date 9-13-01⁵
(signature)
Joe B Bowers Program Manager
(print) (title)

⁵

FINAL NOTE. THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

Locations where References may be found

Bureau of Land and Waste Management, South Carolina Department of Health and
Environmental Control, 2600 Bull Street, South Carolina 29201

Contact telephone and e-mail numbers

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ATTACHMENT 2
DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRIS Event Code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: WOLVERINE BRASS WORKS
Facility Address: CONWAY, Horry County
Facility EPA ID #: SCD 990 704 470

- 1 Has all available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

 √ If yes - check here and continue with #2 below,

 If no - re-evaluate existing data, or

 If data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA) The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

- 2 Is **groundwater** known or reasonably suspected to be "**contaminated**"⁶ above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

 ✓ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation

 If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated"

 If unknown - skip to #8 and enter "IN" status code

Rationale and Reference(s)

| Contaminant (units) | GWPS | Highest Concentration* On May 10 and 11, 2001 (well ID) |
|-----------------------------------|-------|--|
| 1,1-Dichloroethylene (µg/l) | 7 0 | < 5 0 (W-7) |
| Cis-1,2-Dichloroethylene (µg/l) | 70 0 | 61 (W-10) |
| Trans-1,2-Dichloroethylene (µg/l) | 100 0 | 2 0 (W-5) |
| Trichloroethylene (µg/l) | 5 0 | 1 4 (W-4) |
| Vinyl chloride (µg/l) | 2 0 | < 5 0 (W-7, W-10) |
| Barium (mg/l) | 1 0 | 0 072 (W-5) |
| Chromium (mg/l) | 0 05 | 0 038 (W-5) |
| Lead (mg/l) | 0 015 | 0 016 (W-6) |
| Nickel (mg/l) | 0 04 | 1 6 (W-2) |

* Excluding well M-12R, determined to be within one of the regulated units (surface impoundment)

6

"Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses)

- Ref. 1** RCRA Postclosure Care Part A and B Application, revised January 22, 1993
- Ref. 2** Postclosure Permit, issued August 31, 1993
- Ref. 3** RFI Report for Lift Station Investigation, dated December 1996
- Ref. 4** Addendum to RFI Report for Lift Station (SWMU #5), dated May 13, 1998
- Ref. 5** RFI Report for SWMU #5, September 17, 1999
- Ref. 6** SWMU Assessment Report, No 17 and No 18, August 31, 2000
- Ref 7** 2001 Semi-Annual Report on the Effectiveness of the Corrective Action Program and the Solid Waste Management Area, dated August 29, 2001
- Ref. 8** Administrative Record as contained in the Bureau of Land and Waste Management's Central File, SCDHEC

- 3 Has the **migration** of contaminated groundwater **stabilized** such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"⁷ as defined by the monitoring locations designated at the time of this determination?

 √ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"⁷)

 If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"⁷) - skip to #8 and enter "NO" status code, after providing an explanation

 If unknown - skip to #8 and enter "IN" status code

Rationale and Reference(s):

Ref 5, Ref 6, Ref 7, Ref 8

Groundwater quality monitoring in the vicinity of the former impoundments has been ongoing since 1986, and, at the SWMA since 1999. The plumes have been well defined horizontally and vertically. A Corrective Action Program, consisting of continuous pumping from three recovery wells has been in place since 1988. The recovery wells, the resulting cone of depression, and therefore, the capture zone are situated in the vicinity of the former surface impoundments and downgradient of the SWMA.

⁷ "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4 Does "contaminated" groundwater **discharge** into **surface water** bodies?

_____ If yes - continue after identifying potentially affected surface water bodies.

 √ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies

_____ If unknown - skip to #8 and enter "IN" status code

Rationale and Reference(s):

Ref 5, Ref. 6, Ref. 7, Ref 8

Contaminants have been detected in surface water within the drainage canal along the north (side-gradient) boundary of the facility sporadically in the past. The source of these surface-water contaminants has been suspected to be the off-site AVX facility. However, concentrations have been below appropriate levels and, therefore, outside the definition of "contaminated."

- 5 Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration⁸ of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature and number of discharging contaminants, or environmental setting) which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

_____ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration⁸ of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing, and 2) providing a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

_____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration⁸ of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations⁸ greater than 100 times their appropriate groundwater "levels," providing the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identifying if there is evidence that the amount of discharging contaminants is increasing

_____ If unknown - enter "IN" status code in #8

Rationale and Reference(s)

⁸ As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone

- 6 Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented⁹)?

_____ If yes - continue after either 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems) and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater, OR 2) providing or referencing an interim-assessment,¹⁰ appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

⁹ Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

¹⁰ The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

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- _____ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems

- _____ If unknown - skip to 8 and enter "IN" status code

- 7 Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

 √ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

 If no - enter "NO" status code in #8

 If unknown - enter "IN" status code in #8

Rationale and Reference(s):

Ref. 2, Ref 7, Ref 8

Post-Closure Permit No SCD 990 704 470 requires groundwater quality monitoring, on a quarterly basis with semi-annual reporting for the surface impoundments. Beginning with the Fourth Quarter of 1999, the monitoring reports include groundwater quality monitoring data for the SWMA.

- 8 Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility)

✓ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Wolverine Brass Works facility, EPA ID # SCD 990 704 470, located at US Highway 501 in Conway, Horry County, South Carolina. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility

____ NO - Unacceptable migration of contaminated groundwater is observed or expected

____ IN - More information is needed to make a determination.

Completed by Robert F. Hodges, Jr. Date 09/12/01
(signature)
Robert F. Hodges, Jr. Hydrogeologist
(print) (title)

Supervisor Joe B Bowers Date 9-13-01 11
(signature)
Joe B Bowers 9-13-01
(print) (title)

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FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

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Locations where References may be found

Bureau of Land and Waste Management, South Carolina Department of Health and
Environmental Control, 2600 Bull Street, South Carolina 29201

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